What is claimed is:

1. A pseudo-random number sequence output unit responsive to **s** ($1 \leq s$) number of prescribed positive integers $q_1, q_2, \ldots, q_s$, a prescribed real impulse constant **r** ($-1<r<1$), a prescribed non-zero real constant C for outputting a pseudo-random number sequence of length N ($1 \leq N$), which output unit comprises:

an input acceptance section that accepts input of **s** ($1 \leq s$) number of real number sequence initial values $Y_1, Y_2, \ldots, Y_s$ ($-1< Y_1<1, -1< Y_2<1, \ldots, -1\ Y_s<1$), and **s** number of integer parameters $p_1, p_2, \ldots, p_s$ ($2\leq p_1, 2\leq p_2, \ldots 2\leq p_s$) for which $q_1 \bmod p_1 \neq 0$, $q_2 \bmod p_2 \neq 0 \ldots, q_s \bmod p_s \neq 0$ respectively hold with respect to the prescribed positive integers $q_1, q_2 \ldots q_s$;

a calculation section that uses the prescribed real impulse constant **r**, the prescribed non-zero real constant C, the sequence initial values $Y_1, Y_2, \ldots, Y_s$, the integer parameters $p_1, p_2, \ldots, p_s$, the prescribed positive integers $q_1, q_2, \ldots, q_s$ and integers **j** ($1\leq j\leq s$), m ($1\leq m\leq 2N-2$) and **n** ($1\leq n\leq 2N-1$) to calculate from the recurrence formula

$$T_p(\cos\theta) = T(p, \cos\theta) = \cos(p\theta)$$

$$y_j[1] = Y_j$$

$$y_j[m+1] = T(p_j, y_j[m])$$

$$z[n] = \prod_{j=1}^{s} T(q_j, y_j[n])$$

a pseudo-random number sequence z'[1], z'[2], …, z'[N] of length N that satisfies

$$z'[1] = C\sum_{j=1}^{N}(-r)^j z[j],$$

$$z'[2] = C\sum_{j=1}^{N}(-r)^j z[j+1],$$

.

.

.

$$z'[N] = C\sum_{j=1}^{N}(-r)^j z[j+N-1]; \text{ and}$$

an output section that outputs the pseudo-random number sequence z'[1], z'[2], …, z'[N].

2. The output unit according to claim 1, wherein the sequence initial values $Y_1, Y_2, \ldots, Y_s$ satisfy

$$y_k[2] = T(p_k, Y_k)$$

$$y_k[m+1] = T(p_k, y_k[m])$$

$$Y_k = y_k[N+1] = T(p_k, y_k[N])$$

with respect to an integer **k** ($1 \le k \le s$) and an integer **m** ($1 \le m \le N$).

3. The output unit according to claim 1 or 2, wherein the prescribed real impulse constant **r** satisfies

$$2-\sqrt{3}-0.1 \le r \le 2-\sqrt{3}+0.1.$$

4. The output unit according to any of claims 1 to 3, wherein every prescribed positive integer $q_1, q_2 \ldots q_s$ is 1.

5. A transmitter comprising:

an input acceptance section that accepts a signal for transmission;

an output unit

of any of claims 1 to 4 that outputs a pseudo-random number sequence of length N;

a spreading section that uses the output pseudo-random number sequence of length N as a spreading code to spectrum-spread the signal for transmission whose input was accepted; and

a signal transmitting section that transmits the spectrum-spread signal.

6. The transmitter according to claim 5, further comprising:

a selecting section that selects sequence initial values $Y_1, Y_2, \ldots, Y_s$ and integer parameters $p_1, p_2, \ldots, p_s$; and

a parameter transmitting section that transmits the selected sequence initial values $Y_1, Y_2, \ldots, Y_s$ and integer parameters $p_1, p_2, \ldots, p_s$;

the output unit accepting input of the selected sequence initial values $Y_1, Y_2, \ldots, Y_s$ and integer parameters $p_1, p_2, \ldots, p_s$ and outputting a pseudo-random number sequence of length N.

7. The transmitter according to claim 5, further comprising:

a parameter receiving section that receives sequence initial values $Y_1, Y_2, \ldots, Y_s$ and integer parameters $p_1, p_2, \ldots, p_s$;

the output unit accepting input of the received sequence initial values $Y_1, Y_2, \ldots, Y_s$ and integer parameters $p_1, p_2, \ldots, p_s$ and outputting a pseudo-random number sequence of length N.

8. A receiver comprising;

a signal receiving section that receives a signal;

an output unit of any of claims 1 to 4 that outputs a pseudo-random number sequence of length N;

an inverse spreading section that uses the output pseudo-random number sequence of length N as a spreading code to inversely spectrum-spread the received signal; and

an output section that outputs the inversely spectrum-spread signal as a signal for transmission.

9. The receiver according to claim 8, further comprising:

a selecting section that selects sequence initial values $Y_1, Y_2, \ldots, Y_s$ and integer

parameters $p_1, p_2, \ldots, p_s$; and

a parameter transmitting section that transmits the selected sequence initial values $Y_1, Y_2, \ldots, Y_s$ and integer parameters $p_1, p_2, \ldots, p_s$;

the output unit accepting input of the selected sequence initial values $Y_1, Y_2, \ldots, Y_s$ and integer parameters $p_1, p_2, \ldots, p_s$ and outputting a pseudo-random number sequence of length N.

10. The receiver according to claim 8, further comprising:

a parameter receiving section that receives sequence initial values $Y_1, Y_2, \ldots, Y_s$ and integer parameters $p_1, p_2, \ldots, p_s$;

the output unit accepting input of the received sequence initial values $Y_1, Y_2, \ldots, Y_s$ and integer parameters $p_1, p_2, \ldots, p_s$ and outputting a pseudo-random number sequence of length N.

11. A communication system comprising:
the transmitter of claim 6; and
the receiver of claim 10;

the receiver receiving sequence initial values $Y_1, Y_2, \ldots, Y_s$ and integer parameters $p_1, p_2, \ldots, p_s$ transmitted by the transmitter; and

the receiver also receiving a signal transmitted by the transmitter.

12. A communication system comprising:
the transmitter of claim 7; and
the receiver of claim 9;

the transmitter receiving sequence initial values $Y_1, Y_2, \ldots, Y_s$ and integer parameters $p_1, p_2, \ldots, p_s$ transmitted by the receiver; and

the receiver receiving a signal transmitted by the transmitter.

13. A filter unit for filtering a prescribed real impulse constant **r** ($-1<r<1$), the filter unit comprising:

an input terminal that accepts input of an input signal of chip length D;

a delay section that outputs a plurality of signals produced by delaying the input signal whose input was accepted by 0, D, 2D, 3D, ..., (N-1)D;

an amplifying section that amplifies the delayed output signals $(-r)^{(N-T)/D}$ times, where T is the delay time, and outputs the amplified signals;

an adder section that sums the output amplified signals and outputs the resulting sum signal; and

an output terminal that outputs the output sum signal.

14. The filter according to claim 13, wherein one or more of the delay section, amplifying section and adder section of the filter unit are constituted as an ASIC (Application Specific Integrated Circuit), a DSP (Digital Signal Processor) or an FPGA (Field Programmable Gate Array).

15. A pseudo-random number sequence output method that is responsive to **s** ($1\leq s$) number of prescribed positive integers $q_1, q_2, \ldots, q_s$, a prescribed real impulse constant **r** ($-1<r<1$), and a prescribed non-zero real constant C for outputting a pseudo-random number sequence of length N ($1\leq N$), which output method comprises:

an input acceptance step that accepts **s** ($1\leq s$) number of real number sequence initial values $Y_1, Y_2, \ldots, Y_s$ ($-1< Y_1<1, -1< Y_2<1, \ldots, -1\ Y_s<1$), and **s** number of integer parameters $p_1, p_2, \ldots, p_s$ ($2\leq p_1, 2\leq p_2, \ldots 2\leq p_s$) for which $q_1 \bmod p_1 \neq 0$, $q_2 \bmod p_2 \neq 0$ ..., $q_s \bmod p_s \neq 0$ respectively hold with respect to the prescribed positive integers $q_1, q_2 \ldots q_s$;

a calculation step that uses the prescribed real impulse constant **r**, the prescribed non-zero real constant C, the sequence initial values $Y_1, Y_2, \ldots, Y_s$, the integer parameters $p_1, p_2, \ldots, p_s$, the prescribed positive integers $q_1, q_2, \ldots, q_s$ and

integers **j** (1≤j≤s), m (1≤m≤2N-2) and **n** (1≤n≤2N-1) to calculate from the recurrence formula

$$T_p(\cos\theta) = T(p, \cos\theta) = \cos(p\theta)$$

$$y_j[1] = Y_j$$

$$y_j[m+1] = T(p_j, y_j[m])$$

$$z[n] = \prod_{j=1}^{s} T(q_j, y_j[n])$$

a pseudo-random number sequence z'[1], z'[2], …, z'[N] of length N that satisfies

$$z'[1] = C\sum_{j=1}^{N}(-r)^j z[j],$$

$$z'[2] = C\sum_{j=1}^{N}(-r)^j z[j+1],$$

$$\vdots$$

$$z'[N] = C\sum_{j=1}^{N}(-r)^j z[j+N-1];$$ and

an output step that outputs the pseudo-random number sequence z'[1], z'[2], … z'[N].

16. The output method according to the present invention according to claim 15, wherein the sequence initial values Y_1, Y_2, …, Y_s satisfy

$$y_k[2] = T(p_k, Y_k)$$

$$y_k[m+1] = T(p_k, y_k[m])$$

$$Y_k = y_k[N+1] = T(p_k, y_k[N])$$

with respect to an integer **k** (1≤k≤s) and an integer **m** (1≤m≤N).

17. The output method according to claim 15 or 16, wherein the prescribed real impulse constant **r** satisfies

$2-\sqrt{3}-0.1 \le r \le 2-\sqrt{3}+0.1$.

18. The output method according to any of claims 15 to 17, wherein every prescribed positive integer $q_1, q_2 \ldots q_s$ is 1.

19. A transmission method comprising:

an input acceptance step that accepts input of a signal for transmission;

an output step that outputs a pseudo-random number sequence of length N by the output method of any of claims 15 to 18;

a spreading step that uses the output pseudo-random number sequence of length N as a spreading code to spectrum-spread the signal for transmission whose input was accepted; and

a signal transmitting step that transmits the spectrum-spread signal.

20. The transmission method according to claim 19, further comprising:

a selecting step that selects sequence initial values $Y_1, Y_2, \ldots, Y_s$ and integer parameters $p_1, p_2, \ldots, p_s$; and

a parameter transmitting step that transmits the selected sequence initial values $Y_1, Y_2, \ldots, Y_s$ and integer parameters $p_1, p_2, \ldots, p_s$;

the output step accepting input of the selected sequence initial values $Y_1, Y_2, \ldots, Y_s$ and integer parameters $p_1, p_2, \ldots, p_s$ and outputting a pseudo-random number sequence of length N.

21. The transmission method according to claim 19, further comprising:

a parameter receiving step that receives sequence initial values $Y_1, Y_2, \ldots, Y_s$ and integer parameters $p_1, p_2, \ldots, p_s$;

the output step accepting input of the received sequence initial values $Y_1, Y_2,$

..., Y_s and integer parameters p_1, p_2, ..., p_s and outputting a pseudo-random number sequence of length N.

22. A receiving method comprising;

a signal receiving step that receives a signal;

an output step that outputs a pseudo-random number sequence of length N by the output method of any of claims 15 to 18;

an inverse spreading step that uses the output pseudo-random number sequence of length N as a spreading code to inversely spectrum-spread the received signal; and

an output step that outputs the inversely spectrum-spread signal as a signal for transmission.

23. The receiving method according to claim 22, further comprising:

a selecting step that selects sequence initial values Y_1, Y_2, ..., Y_s and integer parameters p_1, p_2, ..., p_s; and

a parameter transmitting step that transmits the selected sequence initial values Y_1, Y_2, ..., Y_s and integer parameters p_1, p_2, ..., p_s;.

the output step accepting input of the selected sequence initial values Y_1, Y_2, ..., Y_s and integer parameters p_1, p_2, ..., p_s and outputting a pseudo-random number sequence of length N.

24. The receiving method according to claim 22, further comprising:

a parameter receiving step that receives sequence initial values Y_1, Y_2, ..., Y_s and integer parameters p_1, p_2, ..., p_s ;

the output step accepting input of the received sequence initial values Y_1, Y_2, ..., Y_s and integer parameters p_1, p_2, ..., p_s and outputting a pseudo-random number

sequence of length N.

25. A filtering method for filtering a prescribed real impulse constant **r** ($-1<r<1$), the filtering method comprising:

an input step that accepts input of an input signal of chip length D;

a delaying step that outputs a plurality of signals produced by delaying the input signal whose input was accepted by 0, D, 2D, 3D, ..., (N-1)D;

an amplifying step that amplifies the delayed output signals $(-r)^{(N-T)/D}$ times, where T is the delay time, and outputs the amplified signals;

a summing step that sums the output amplified signals and outputs the resulting sum signal; and

an output step that outputs the output sum signal.

26. A computer-readable data recording medium recorded with a program that enables a computer to function as an output unit output unit responsive to **s** ($1\leq s$) number of prescribed positive integers $q_1, q_2, \ldots, q_s$, a prescribed real impulse constant **r** ($-1<r<1$), and a prescribed non-zero real constant C for outputting a pseudo-random number sequence of length N ($1\leq N$), which output unit comprises:

an input acceptance section that accepts input of **s** ($1\leq s$) number of real number sequence initial values $Y_1, Y_2, \ldots, Y_s$ ($-1< Y_1<1$, $-1< Y_2<1$, ..., $-1\ Y_s<1$), and **s** number of integer parameters $p_1, p_2, \ldots, p_s$ ($2\leq p_1$, $2\leq p_2$, ... $2\leq p_s$) for which $q_1 \bmod p_1 \neq 0$, $q_2 \bmod p_2 \neq 0$ ..., $q_s \bmod p_s \neq 0$ respectively hold with respect to the prescribed positive integers $q_1, q_2 \ldots q_s$;

a calculation section that uses the prescribed real impulse constant **r**, the prescribed non-zero real constant C, the sequence initial values $Y_1, Y_2, \ldots, Y_s$, the integer parameters $p_1, p_2, \ldots, p_s$, the prescribed positive integers $q_1, q_2, \ldots, q_s$ and integers **j** ($1\leq j\leq s$), m ($1\leq m\leq 2N-2$) and **n** ($1\leq n\leq 2N-1$) to calculate from the recurrence formula

$$T_p(\cos\theta) = T(p, \cos\theta) = \cos(p\theta)$$

$$y_j[1] = Y_j$$

$$y_j[m+1] = T(p_j, y_j[m])$$

$$z[n] = \prod_{j=1}^{s} T(q_j, y_j[n])$$

a pseudo-random number sequence z'[1], z'[2], …, z'[N] of length N that satisfies

$$z'[1] = C\sum_{j=1}^{N}(-r)^j z[j],$$

$$z'[2] = C\sum_{j=1}^{N}(-r)^j z[j+1],$$

.
.
.

$$z'[N] = C\sum_{j=1}^{N}(-r)^j z[j+N-1];\text{ and}$$

an output section that outputs the pseudo-random number sequence z'[1], z'[2], …, z'[N].

27. The data recording medium according to claim 26, whose program operates the computer to function so that the sequence initial values Y_1, Y_2, …, Y_s satisfy

$$y_k[2] = T(p_k, Y_k)$$

$$y_k[m+1] = T(p_k, y_k[m])$$

$$Y_k = y_k[N+1] = T(p_k, y_k[N])$$

with respect to an integer **k** ($1 \le k \le s$) and an integer **m** ($1 \le m \le N$).

28. The data recording medium according to claims 26 or 27, whose program operates the computer to function so that the prescribed real impulse constant **r** satisfies

$$2-\sqrt{3}-0.1 \le r \le 2-\sqrt{3}+0.1.$$

29. The data recording medium according to any of claims 26 to 28, whose program operates the computer to function so that every prescribed positive integer q_1, $q_2 \ldots q_s$ is 1.

30. A computer-readable data recording medium recorded with a program that enables a computer to function as a transmitter comprising:

an input acceptance section that accepts a signal for transmission;

an output unit of any of claims 1 to 4 that outputs a pseudo-random number sequence of length N;

a spreading section that uses the output pseudo-random number sequence of length N as a spreading code to spectrum-spread the signal for transmission whose input was accepted; and

a signal transmitting section that transmits the spectrum-spread signal.

31. The data recording medium according to claim 30, whose program further operates the computer to function as:

a selecting section that selects sequence initial values $Y_1, Y_2, \ldots, Y_s$ and integer parameters $p_1, p_2, \ldots, p_s$; and

a parameter transmitting section that transmits the selected sequence initial values $Y_1, Y_2, \ldots, Y_s$ and integer parameters $p_1, p_2, \ldots, p_s$; and

operates the output unit to accept input of the selected sequence initial values $Y_1, Y_2, \ldots, Y_s$ and integer parameters $p_1, p_2, \ldots, p_s$ and output a pseudo-random number sequence of length N.

32. The data recording medium according to claim 30, whose program further operates the computer to function as:

a parameter receiving section that receives sequence initial values $Y_1, Y_2, \ldots, Y_s$ and integer parameters $p_1, p_2, \ldots, p_s$; and

operates the output unit to accept input of the received sequence initial values $Y_1, Y_2, \ldots, Y_s$ and integer parameters $p_1, p_2, \ldots, p_s$ and output a pseudo-random number sequence of length N.

33. A computer-readable data recording medium recorded with a program that enables a computer to function as a receiver comprising:

a signal receiving section that receives a signal;

an output unit of any of claims 1 to 4 that outputs a pseudo-random number sequence of length N;

an inverse spreading section that uses the output pseudo-random number sequence of length N as a spreading code to inversely spectrum-spread the received signal; and

an output section that outputs the inversely spectrum-spread signal as a signal for transmission.

34. The data recording medium according to claim 33, whose program further operates the computer to function as:

a selecting section that selects sequence initial values $Y_1, Y_2, \ldots, Y_s$ and integer parameters $p_1, p_2, \ldots, p_s$; and

a parameter transmitting section that transmits the selected sequence initial values $Y_1, Y_2, \ldots, Y_s$ and integer parameters $p_1, p_2, \ldots, p_s$; and

operates the output unit to accept input of the selected sequence initial values $Y_1, Y_2, \ldots, Y_s$ and integer parameters $p_1, p_2, \ldots, p_s$ and output a pseudo-random number sequence of length N.

35. The data recording medium according to claim 33, whose program further operates the computer to function as:

a parameter receiving section that receives sequence initial values $Y_1, Y_2, \ldots,$

Y_s and integer parameters $p_1, p_2, \ldots, p_s$; and

operates the output unit to accept input of the received sequence initial values $Y_1, Y_2, \ldots, Y_s$ and integer parameters $p_1, p_2, \ldots, p_s$ and output a pseudo-random number sequence of length N.

36. A computer-readable data recording medium recorded with a program that enables any of a computer, DSP (Digital Signal Processor) and FPGA (Field Programmable Gate Array) to function as filter unit for filtering a prescribed real impulse constant **r** ($-1<r<1$), the filter unit comprising:

an input terminal that accepts input of an input signal of chip length D;

a delay section that outputs a plurality of signals produced by delaying the input signal whose input was accepted by 0, D, 2D, 3D, ..., (N-1)D;

an amplifying section that amplifies the delayed output signals $(-r)^{(N-T)/D}$ times, where T is the delay time, and outputs the amplified signals;

an adder section that sums the output amplified signals and outputs the resulting sum signal; and

an output terminal that outputs the output sum signal.

37. A data recording medium according to any of claims 26 to 36, wherein the data recording medium is a compact disk, floppy disk, hard disk, magneto-optical disk, digital video disk, magnetic tape, or semiconductor memory.